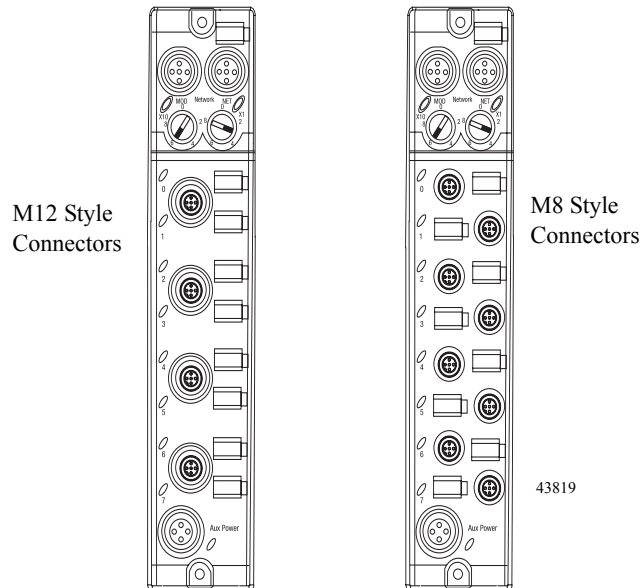


EH-RIO IP67 Profibus-DP I/O modules

(RIO-PBXDP8M12, -PBXDP8M8, -PBYTP8M12, -PBYTP8M8, -PBXYP8M12, -PBXYP8M8)



The EH-RIO IP67 Profibus-DP I/O modules are stand-alone 24VDC I/O modules which are communicating via the PROFIBUS network. The sealed IP67 housing of these modules requires no enclosure. (Note that environmental requirements other than IP67 may require an additional appropriate enclosure.) I/O connectors are sealed M8 (pico) or M12 (micro) styles while the network and auxiliary power connectors are sealed M12 style.

Important User Information

Solid state equipment has operational characteristics differing from those of electromechanical equipment. Because of this difference, and also because of the wide variety of uses for solid state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

In no event will Hitachi Europe be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.




The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Hitachi Europe cannot assume responsibility or liability for actual use based on the examples and diagrams.

No patent liability is assumed by Hitachi Europe with respect to use of information, circuits, equipment, or software described in this manual.

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Throughout this manual we use notes to make you aware of safety considerations.

Important User Information

<p>WARNING</p> 	<p>Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.</p>
<p>ATTENTION</p> 	<p>Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you:</p> <ul style="list-style-type: none"> • identify a hazard • avoid a hazard • recognize the consequence
<p>IMPORTANT</p>	<p>Identifies information that is critical for successful application and understanding of the product.</p>
<p>SHOCK HAZARD</p> 	<p>Labels may be located on or inside the module to alert people that dangerous voltage may be present.</p>

ATTENTION



Environment and Enclosure

This equipment is intended for use in overvoltage Category II applications (as defined in IEC publication 60664-1), at altitudes up to 2000 meters without derating.

This equipment is considered Group 1, Class A industrial equipment according to IEC/CISPR Publication 11. Without appropriate precautions, there may be potential difficulties ensuring electromagnetic compatibility in other environments due to conducted as well as radiated disturbance.

This equipment is supplied as "enclosed" equipment. It should not require additional system enclosure when used in locations consistent with the enclosure type ratings stated in the Specifications section of this publication. Subsequent sections of this publication may contain additional information regarding specific enclosure type ratings, beyond what this product provides, that are required to comply with certain product safety certifications.

NOTE: See NEMA Standards publication 250 and IEC publication 60529, as applicable, for explanations of the degrees of protection provided by different types of enclosure. Also, see the appropriate sections in this publication.

ATTENTION**Preventing Electrostatic Discharge**

This equipment is sensitive to electrostatic discharge, which can cause internal damage and affect normal operation. Follow these guidelines when you handle this equipment:

- Touch a grounded object to discharge potential static.
- Wear an approved grounding wriststrap.
- Do not touch connectors or pins on component boards.
- Do not touch circuit components inside the equipment.
- If available, use a static-safe workstation.
- When not in use, store the equipment in appropriate static-safe packaging.

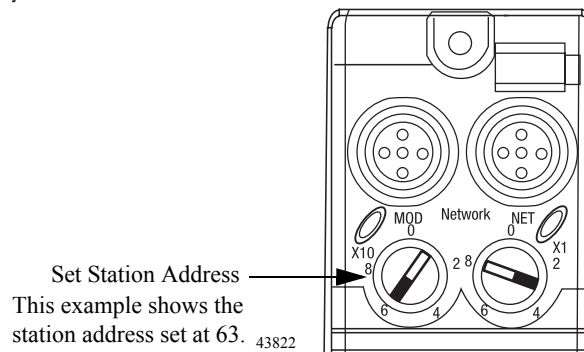
Install Your EH-RIO IP67 I/O Module

To install the module:

- Set the station address
- Mount the module
- Connect the cord sets
- Attach the network cables
- Communicate with the module

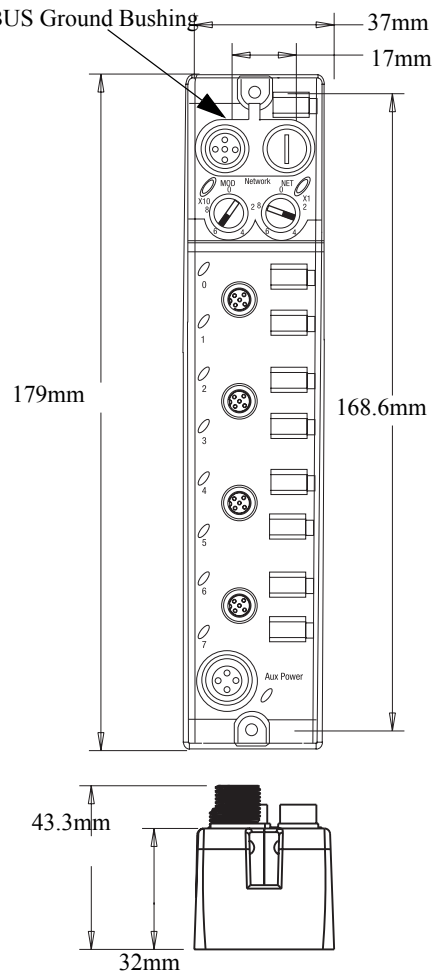
Set the Station Address

To set the station address, adjust the switches on the front of the module. The two switches are most significant digit (MSD) and least significant digit (LSD). The switches can be set from 00 and 99. The module reads the switches at power-up only.



Mount the Module

Use the mounting holes on the module to mount the module directly to a panel or machine. Mounting holes accommodate M3 pan-head screws. The torque specification is 0.6 Nm. We recommend that you do not use the side mounting holes with this module because there is no means to ground the module.

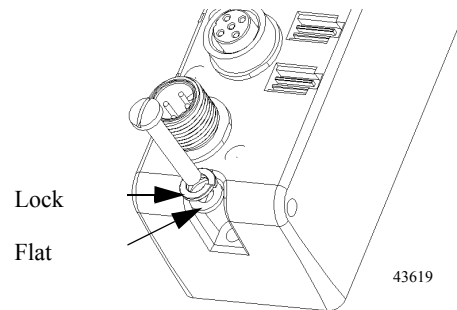


43817

Front Mounting

Mount the Module in High Vibration Areas

If you will mount the module in an area that is subject to shock or vibration, we recommend that you use a flat and lock washer to mount the module. Mount the flat and lock washer as shown in the following illustration. Torque the mounting screws to 0.6 Nm.



Connect the Input/Output Cord Sets to the EH-RIO IP67 Module

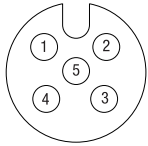
The IP67 family offers 5-pin micro-style PCB mounting connectors or 3-pin pico-style PCB mounting connectors.

We provide caps to cover the unused connectors on your module. Connect the quick-disconnect cord sets you selected for your module to the appropriate ports.

Pinout diagrams for the connectors are shown below.

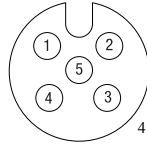
5-Pin Micro-Style (12mm) Female

Input Connector



RIO-PBXDP8M12
(view into connector)

- Pin 1 Sensor Source Voltage
- Pin 2 Input B
- Pin 3 Return
- Pin 4 Input A
- Pin 5 Not used



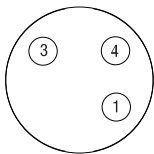
- 41452
- Pin 1 Not Used
 - Pin 2 Output B
 - Pin 3 Return
 - Pin 4 Output A
 - Pin 5 Not Used

Output Connector

RIO-PBYTP8M12
(view into connector)

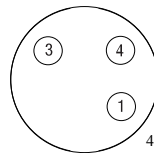
3-Pin Pico-Style (8mm) Female

Input Connector



RIO-PBXDP8M8
(view into connector)

- Pin 1 Sensor Source voltage
- Pin 3 Return
- Pin 4 Input



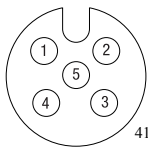
- 43583
- Pin 1 Not Used
 - Pin 3 Return
 - Pin 4 Output

Output Connector

RIO-PBYTP8M8
(view into connector)

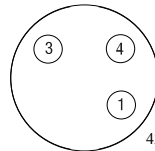
Self-configuring Female Connectors

Self-configuring Connector



RIO-PBXYP8M12
(view into connector)

- 41452
- Pin 1 Sensor Source Voltage
 - Pin 2 Input or Output B
 - Pin 3 Return
 - Pin 4 Input or Output A
 - Pin 5 Not Used



- 43583
- Pin 1 Sensor Source Voltage
 - Pin 3 Return
 - Pin 4 Input or Output

Self-configuring Connector

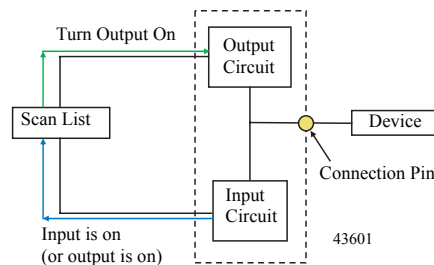
RIO-PBXYP8M8
(view into connector)

The self-configuring modules (RIO-PBXYP8M12 and RIO-PBXYP8M8) contain both input and output functionality.

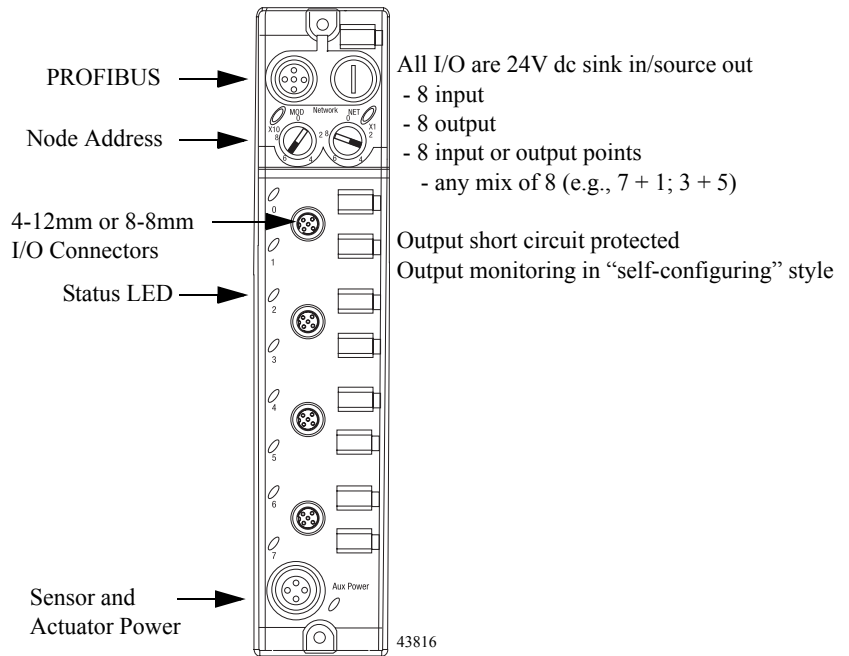
If an I/O point is to be an output, dedicate that point as an output with a wired load and energize it through a control program. Energized outputs will show an associated active input, which can be used as a feedback mechanism to ensure that the output is turned on.

If an I/O point is to be an input, wire the input device as normal and leave the associated output un-energized at all times.

I/O Self-configuring Circuitry



Refer to the illustration below for configuration operations.



IMPORTANT

If the devices (sensors) connected to the input connections require Class 2 power to operate, the auxiliary power connections of this equipment must be powered by a Class 2 source.

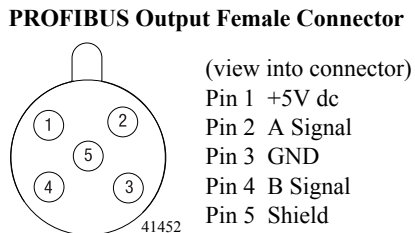
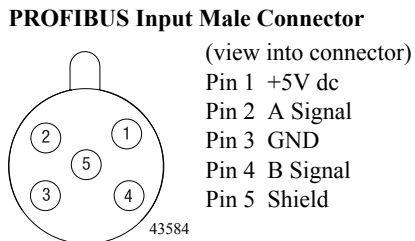
ATTENTION



Make sure all connectors and caps are securely tightened to properly seal the connections against leaks and maintain IP67 requirements.

Attach PROFIBUS Cables

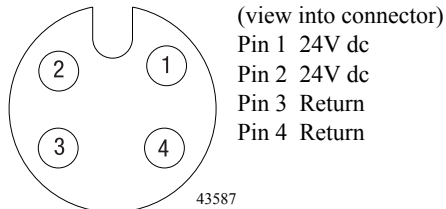
Attach the 5-pin (12mm) PROFIBUS-style connectors as shown below.



To terminate the module, use the second PROFIBUS connector and a PROFIBUS terminator resistor . **NOTE:** Do not use PROFIBUS T connectors with these modules.

Attach Auxiliary Power Cable

Attach the 4-pin (12mm) micro-style connector as shown below.



Input and output devices are powered through the module’s I/O connectors. Removing auxiliary power will deactivate all sensors and actuators unless they are powered from a separate source. If a separate source is used, devices may still be active, even if auxiliary power is removed. To ensure that auxiliary power controls the activation/deactivation of sensors and actuators, always wire input sensors and output actuators directly to the I/O connectors.

Communicate With Your EH-RIO IP67 PROFIBUS Module

The EH-RIO IP67 PROFIBUS module has the following baud rates.

Baud Rate	Cable Length
9.6KBPS	1000m
19.2KBPS	1000m
45.45KBPS	1000m
93.75KBPS	1000m
187.5KBPS	1000m

Baud Rate	Cable Length
500KBPS	400m
1.5MBPS	200m
3MBPS	100m
6MBPS	100m
12MBPS	100m

RIO-PBXYP8M12 and RIO-PBXYP8M8

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Produced 0	I7	I6	I5	I4	I3	I2	I1	I0
Consumes 0	O7	O6	O5	O4	O3	O2	O1	O0

Where: I=Input O=Output

Note that the RIO-PBXYP8M12 and RIO-PBXYP8M8 self-assigning modules contain both input and output functionality. These modules do not need to be configured.

If an I/O point is to be an output, dedicate that point as an output with a wired load and energize it through a control program.

If an I/O point is to be an input, wire the input device as normal and leave the associated output un-energized at all times.

RIO-PBXDP8M12 and RIO-PBXDP8M8

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Produced 0	I7	I6	I5	I4	I3	I2	I1	I0

Where: I=Input

RIO-PBYTP8M12 and RIO-PBYTP8M8

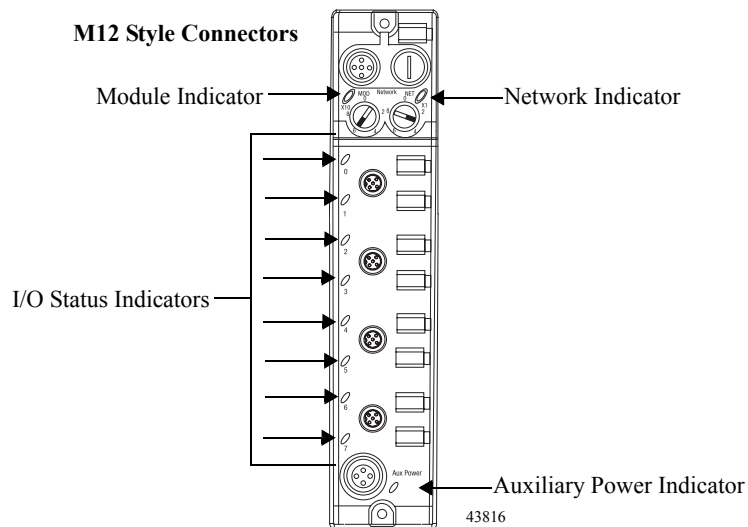
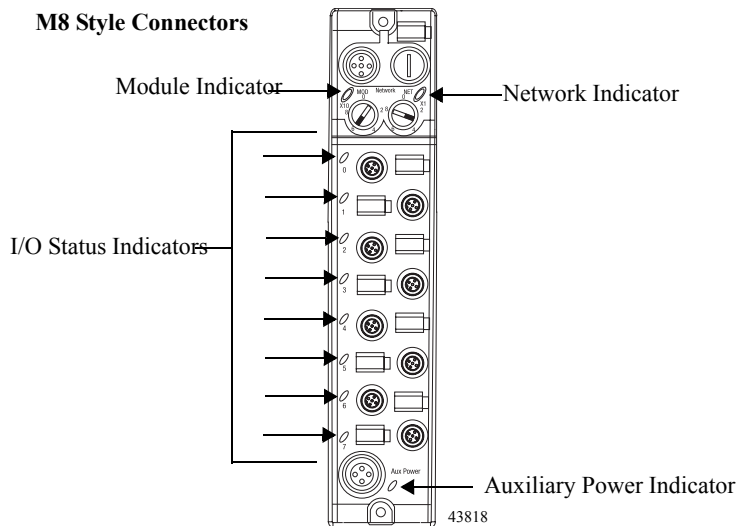
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Consumes 0	O7	O6	O5	O4	O3	O2	O1	O0

Where: O=Output

Troubleshoot With the Indicators

This module has the following indicators:

- Network and Module status indicator for PROFIBUS
- Auxiliary Power indicator
- Individual I/O status indicators for inputs and outputs



The following table describes network status and module indicators.

LED Is	Module LED	Network LED (Watchdog (WD) State & DP State)
Off	No module power	Power Off or WD_State → Baud rate search mode
Flashing Green	Not used	WD_State → Baud rate search complete and DP_State → No Data Exchange mode
Solid Green	Module operating normal	DP_State → Data Exchange mode
Flashing Red	Minor fault: Unknown Ident_Number	Not used
Solid Red	Unrecoverable fault: - DPC31 ASIC fault - EEPROM Read/Write fault	Not used

The following table describes the auxiliary power indicator.

Auxiliary Power	
Indication	Status
None	No Auxiliary Power
Solid Green	Auxiliary Power Present

The following table describes individual I/O status indicators.

I/O Status Indicators		
Function	Point Indicator	Status
Outputs	None	Output not energized
	Yellow	Output energized
Inputs	None	No valid input
	Yellow	Valid input

Specifications

Following are specifications for the EH-RIO IP67 I/O modules.

PROFIBUS EH-RIO IP67 I/O modules	
Input Specifications	
Inputs	61131-2 Type 3 Compatible
Sensor Source Current, Maximum (per input)	50mA
Sensor Source Current, Maximum (per module)	400mA
Sensor Source Voltage (auxiliary power=12-30V dc)	
Maximum	30V
Minimum	11V
On-state Voltage	
Maximum	30V dc
Minimum	11V dc

On-state Current, Maximum	5mA
PROFIBUS EH-RIO IP67 I/O modules	
Off-state Voltage, Maximum	5V dc
Off-state Current, Maximum	1.5mA
Output Specifications	
Outputs	61131-2 Compatible
Off-state Peak Blocking Voltage, Minimum	30V
On-state Voltage Drop, Maximum	0.5V
On-state Current, Maximum	0.5A
Off-state Leakage, Maximum	50 μ A
Module Current, Maximum (all outputs)	4.0A
Surge Current - for 10ms, repeatable every 2s, Maximum	1.2A
PROFIBUS Specifications	
Network Protocol	PROFIBUS-DP (EN50170) Communication with a Class 1/Class 2 master
Redundancy	Not supported
Repeater Control Signal	RS485
Implementation Type	DPC31
Freeze Mode	Supported
Sync Mode	Supported
Auto Baud Rate	Supported
Fail Safe Mode	Supported
Station Type	DP Slave
FMS Support	Not Supported
Number of Stations	100 maximum
Network Length/ Communication Rate	9.6KBPS @ 1000m 19.2KBPS @ 1000m 45.45KBPS @ 1000m 93.75KBPS @ 1000m 187.5KBPS @ 1000m 500KBPS @ 400m 1.5MBPS @ 200m 3MBPS @ 100m 6MBPS @ 100m 12MBPS @ 100m
General Specifications	
Isolation	Type tested to 500V ac for 60 seconds between auxiliary power and network (I/O to logic)
Dimensions (Millimeters)	179H x 37W x 43.3D
Indicators	Module Status - red/green Network Status - red/green Auxiliary Power - green Point LED - yellow
Auxiliary Voltage Maximum Minimum	30V dc 11V dc
Auxiliary Current -RIO-PBXDP8, Maximum -RIO-PBYTP8, Maximum -RIO-PBXYP8, Maximum	550mA 4A 4A
Operating Temperature	IEC 60068-2-1 (Test Ad, Operating Cold), IEC 60068-2-2 (Test Bd, Operating Dry Heat), IEC 60068-2-14 (Test Nb, Operating Thermal Shock): -20 to 60°C (-4 to 140°F)

General Specifications (continued)	
Storage Temperature	IEC 60068-2-1 (Test Ab, Un-packaged Non-operating Cold), IEC 60068-2-2 (Test Bb, Un-packaged Non-operating Dry Heat), IEC 60068-2-14 (Test Na, Un-packaged Non-operating Thermal Shock): -45 to 85°C (-49 to 185°F)
Relative Humidity	IEC 60068-2-30 (Test Db, Un-packaged Non-operating Damp Heat): 5-95% non-condensing
Shock	IEC60068-2-27 (Test Ea, Unpackaged Shock): Operating 30g Non-operating 50g
Vibration	IEC60068-2-6 (Test Fc, Operating): 5g @ 10-500Hz
Conductor Category	2
ESD Immunity	IEC 61000-4-2: 6kV contact discharges 8kV air discharges
Radiated RF Immunity	IEC 61000-4-3: 10V/m with 1kHz sine-wave 80%AM from 30MHz to 2000MHz 10V/m with 200Hz 50% Pulse 100%AM at 900Mhz 10V/m with 200Hz 50% Pulse 100%AM at 1890Mhz
EFT/B Immunity	IEC 61000-4-4: ±2kV at 5kHz on signal ports ±2kV at 5kHz on communications ports ±4kV at 5.0kHz on power ports
Surge Transient Immunity	IEC 61000-4-5: ±1kV line-line(DM) and ±2kV line-earth(CM) on signal ports ±1kV line-line(DM) and ±2kV line-earth(CM) on power ports ±2kV line-earth(CM) on shielded ports
Conducted RF Immunity	IEC 61000-4-6: 10Vrms with 1kHz sine-wave 80%AM from 150kHz to 80MHz
Emissions	CISPR 11: Group 1, Class A
Enclosure	Meets IP65/66/67 (when marked)
Weight	0.216 kg
Certifications: (when product is marked)	c-UL-us UL Listed Industrial Control Equipment, certified for US and Canada CE European Union 89/336/EEC EMC Directive, compliant with: EN 61000-6-4; Industrial Emissions EN 50082-2; Industrial Immunity EN 61326; Meas./Control/Lab. Industrial Requirements EN 61000-6-2; Industrial Immunity C-Tick Australian Radiocommunications Act, compliant with: AS/NZS CISPR 11; Industrial Emissions

